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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,597	09/05/2006	Tohru Yamaoka	071971-0724	3387
53080 7590 03/04/2010 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, NW WASHINGTON, DC 20005-3096				
EXAMINER				
LE, HUYEN D				
ART UNIT		PAPER NUMBER		
2614				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/591,597

**Applicant(s)**

YAMAOKA ET AL.

**Examiner**

HUYEN D. LE

**Art Unit**

2614

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02/19/10.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date 02/19/10
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6-11, 13-17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Mitchell et al. (US 5,573,679).

Regarding claims 1, 3, 6, 9, 11 and , as broadly claimed, Mitchell et al. teaches a MEMS device comprising a first film (18) including a first electrode (22), a second film (12) including a second electrode (16), an air gap (30, figure 1) formed between the first film and second film, wherein a first insulating film (28) is formed on part of the first film facing the air gap (30), a second insulating film (26) is formed on part of the second film facing the air gap (30), and wherein the air gap (30) is formed by removing a sacrificial film (24) formed between the first film and the second film (col. 5, lines 23-25).

Mitchell further teaches a top portion (20, figure 1), facing to the first electrode (22), of the air gap being in contact with the first insulating film (28), and a bottom portion (14), facing the second electrode (16), of the air gap being in contact with the second insulating film (26).

Regarding claim 2, Mitchell et al. teaches the first electrode (22) that has a through hole (34) as claimed.

Regarding claim 7, Mitchell et al. shows the first insulating film (28) is formed so that the first electrode (22) does not come in contact with the air gap and the second insulating film (26)

is formed so that the second electrode (16) does not come in contact with the air gap (figure 2B, 2C, 2D).

Regarding claim 8, Mitchell shows the thickness of the air gap that is determined substantially by the thickness of the sacrificial film as claimed (figures 1, 2B).

Regarding claim 10, Mitchell teaches the first or second film (12) that vibrates upon receipt of sound pressure.

Regarding claims 13 and 14, Mitchell shows a protrusion and a recess corresponding to the protrusion that is formed in the first film (18) as claimed (figure 1).

Regarding claims 15-17, Mitchell teaches a first film (12, 14) that is formed on a semiconductor substrate (10) and a through hole as claimed (32, figures 1, 2C, 2D and col. 6, lines 41-50).

Regarding claims 1, 3 and 4, as interpreted in a different manner, Mitchell et al. teaches a MEMS device comprising a first film including a first electrode (22), a second film including a second electrode (16), an air gap (30, figure 1) formed between the first film and second film, wherein a first insulating film (20, 28) is formed on part of the first film facing the air gap (30), a second insulating film (14, 26) is formed on part of the second film facing the air gap (30), and wherein the first insulating film (20) and the second insulating film (14) are silicon nitride films (col. 5, line 52 and col. 6, lines 30-34). Mitchell teaches the air gap (30) is formed by removing a sacrificial film (24) formed between the first film and the second film (col. 5, lines 23-25). Mitchell further teaches a top portion (28, figure 1), facing to the first electrode (22), of the air gap being in contact with the first insulating film (20), and a bottom portion (26), facing the second electrode (16), of the air gap being in contact with the second insulating film (14).

Regarding claim 19, Mitchell et al. teaches a part of the sacrificial film (24) that is formed between the first and second films as a support portion, and the air gap (30) that is substantially surrounded by the first and second insulating films as claimed (figure 1 and see col. 5, lines 23-25).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 5, 12 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitchell et al. (US 5,573,679).

Regarding claim 5, Mitchell et al. teaches one layer for the sacrificial film (24). Mitchell et al. does not specifically teach the film (24) is a lamination layer of a plurality of insulating films as claimed. However, it would have been obvious to one skilled in the art to provide a

lamination layer of a plurality of insulating films made of the same material for the sacrificial film (24) for better providing and adjusting the thickness or the distance between the electrode layers in the microphone device.

Regarding claim 12, Mitchell does not specifically teach that the air gap is formed by removing a part of the sacrificial film by wet etching as claimed. However, Mitchell does not restrict to any type of etching techniques (col. 2, lines 39-52), and providing a wet etching in the capacitive microphone is known in the art.

Therefore, it would have been obvious to one skilled in the art to provide any etching techniques for the sacrificial film (24) of Mitchell such as a wet etching technique for an alternate choice.

Regarding claim 18, Mitchell teaches a first film (12, 14) that is formed on a semiconductor substrate (10) as claimed. Mitchell does not disclose the semiconductor substrate being placed on a printed circuit board and a field effect transistor as claimed. However, providing a printed circuit board and a field effect transistor in a capacitive microphone device is well known in the art.

Therefore, it would have been obvious to one skilled in the art to provide the semiconductor substrate (10) of the microphone placed on a printed circuit board and connected to a field effect transistor which is formed on the circuit board for better processing the electrical signals in the device.

***Response to Arguments***

5. Applicant's arguments filed 02/19/2010 have been fully considered but they are not persuasive.

Responding to the arguments about the limitations of the top portion of the air gap and the bottom portion of the air gap as claimed in claim 1, the examiner has explained in detail in the Office Action. Mitchell et al. shows the top portion (20, figure 1), facing to the first electrode (22), of the air gap being in contact with the first insulating film (28), and a bottom portion (14), facing the second electrode (16), of the air gap being in contact with the second insulating film (26).

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUYEN D. LE whose telephone number is (571) 272-7502. The examiner can normally be reached on 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CURTIS KUNTZ can be reached on (571) 272-7499. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HUYEN D. LE/  
Primary Examiner, Art Unit 2614

HL  
March 1, 2010